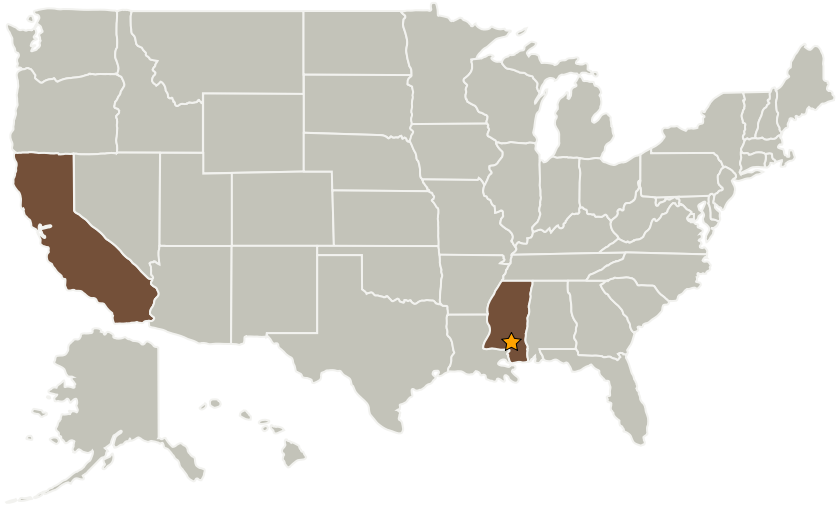
Intelligent Multi-Resolution 3D Modeling, Compression, Registration, Fusion and Recognition, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

NASA missions are being designed for multisensor data collection and synthesis using diverse temporal, spatial and spectral resolutions for use by multiple teams of mission specialists and scientists. This project offers two closely related technologies that will benefit the distribution, sharing and use of fused datasets.(1) Artificial intelligence and machine learning is used to generate a novel intelligence-based 3D meshing, and compression method based on hierarchical tetrahedral and binary triangular decomposition applicable to both surfaces and volumes, providing high compression performance . Meshing is progressive and adaptive to any resolution and for any selected region in the scene, thus making it possible to model certain regions with high resolution while leaving the remaining parts coarse. (2) Meshing is then interleaved iteratively with registration to search for optimal alignment of overlapping 3D models by, in one case minimizing an error objective function, and in another case maximizing a similarity measure for aligning decomposition trees associated with the overlapping models. Following alignment, an integration algorithm fuses overlapping models. The anticipated results are effective 3D modeling and registration technologies that significantly assist NASA?s R&D mission.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
UtopiaCompression Corporation	Supporting Organization	Industry	Los Angeles, California

Primary U.S. Work Locations	
California	Mississippi

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jacob Yadegar

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.4 Science Modeling